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(54) **Anti-theft tag.**

(57) An anti-theft tag comprises a carrier provided with indicator means, and also a counterpart which can be fastened to the carrier, which carrier has a housing which is provided with locking means and in which a pin of the counterpart can be locked. The housing has an essentially cylindrical main bore enclosing the pin in a close fit, and at least one auxiliary bore running at an acute angle relative to the main bore and opening out into it, which auxiliary bore contains a ball of magnetisable material which is pressed under spring pre-tension in the direction of the main bore in such a way that the pin can be inserted past the ball, but can be clamped in the opposite direction between the ball and the wall of the main bore.

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The invention relates to an anti-theft tag comprising a carrier provided with indicator means, and also a counterpart which can be fastened to the carrier, which carrier has a housing which is provided with locking means and in which a pin of the counterpart can be locked.

Such an anti-theft tag is known from Dutch Patent Application NL-A-8800367. In the case of this known tag use is made of three balls which are pressed by a spring into a locking position. The pin can be inserted easily, but as a result of the tapering guidance of the balls between the wall of the housing and the pin, it cannot be removed again. The balls can be pulled out of their locking position by using a magnetic field, following which the pin can be removed again.

This known tag has various disadvantages. First of all, it consists of a relatively large number of parts, which adversely affects the cost of the tag. Assembling the complete tag is quite labour-intensive, which further adversely affects the cost. If the three balls are not positioned correctly relative to the pin, the locking action also leaves something to be desired. If their engagement points on the surface of the pin are shifted a little relative to each other along the axis of the pin, the pin can also be bent. This means that the locking action is not as good for subsequent applications.

The object of the invention is therefore to provide a tag of the abovementioned type which does not have these disadvantages. This is achieved through the fact that the housing has an essentially cylindrical main bore enclosing the pin in a close fit, and at least one auxiliary bore which runs at an acute angle relative to the main bore and opens out therein, which auxiliary bore contains a ball of magnetisable material which is pressed under spring pre-tension in the direction of the main bore in such a way that the pin can be inserted past the ball, but can be clamped in the opposite direction between the ball and the wall of the main bore.

The tag according to the invention has fewer parts than the known tag, while assembling it is also considerably simpler. The ball can now be inserted into its own auxiliary bore, and is held in place there. No further parts are needed other than a spring to press the ball in the desired direction. An inserted pin is pressed, under the influence of the spring pre-tension exerted on the ball, against the part of the first bore which lies more or less opposite the engagement point of the ball. This means that a proper support of the pin is always ensured opposite the engagement point of the ball. As a result, a proper locking action is also always ensured. This constitutes a major advantage compared with the known tag in which three balls are used. As already mentioned, these balls can be displaced slightly relative to each other, which adversely affects locking action.

The auxiliary bore must run at a certain angle rel-

ative to the first bore. For this purpose, provision is made according to the invention for the auxiliary bore to run facing away from the insertion hole of the main bore at an angle between 3 and 10° relative thereto. The best results are obtained if the angle between the two bores is 6°.

In order to facilitate unlocking of the ball under the influence of a magnetic field, a sliding part made of magnetisable material is situated between the ball and the spring. The magnetic field makes the sliding part also magnetic, with the result that an exceptionally great force can be exerted on the ball, in such a way that it can be pulled reliably out of its locking position.

According to a preferred embodiment of the invention, the diameter of the ball is greater than the diameter of the main bore. In this embodiment it is ensured that when there is no pin in the first bore the ball cannot escape through the first bore. As soon as the pin is inserted, it pushes the ball back, with the result that locking action can begin.

The housing of the tag can have a single auxiliary bore with ball. An excellent locking action can already be ensured by means of a single ball. The manufacturing costs of such a design are also low. Nevertheless, it is also possible to provide various auxiliary bores, each containing a ball, which auxiliary bores all lie at one and the same side of a plane determined by the centre line of the main bore. In the case of such an embodiment also the pin of the counterpart is reliably pressed against the wall of the main bore, in view of the asymmetrical positioning of the auxiliary bores. In the case of all these embodiments it must thus always be ensured that, however many auxiliary bores with ball pressed under spring force are used, this important characteristic of the invention is met.

According to a variant, each auxiliary bore opens out at the same level, in the direction of the centre line of the main bore. As an example in this case, provision can be made for two auxiliary bores of which the projections of the centre lines on a plane perpendicular to the centre line of the main bore form an angle of 90°.

According to a further variant, the auxiliary bores can open out in the main bore at various levels, in the direction of the centre line of the main bore.

The tag can be designed in the known way, as described in, for example, NL-A-8800367. According to a preferred embodiment of the invention, the carrier is, however, in the form of a flat plastic plate, and the housing is fixed in a hole in the plastic plate by means of a raised edge all the way round the insertion hole of the main bore. Such an embodiment can be produced at low cost.

A further simplification of the production process, and thus lowering of the costs, can be obtained if the housing comprises a cylindrical element which has a central main bore and at least one auxiliary bore

opening out at one end of the element, the cylindrical element having at the other end a shoulder which surrounds the main bore and has a raised edge, which shoulder is intended for insertion into a hole provided in the plastic plate, and which edge is designed to be folded over outwards onto the plastic plate.

It is advantageous if in this case there is a raised edge also at the side of the housing where the auxiliary bore opens out, said raised edge being designed to be folded over inwards over a cover plate fitting inside said edge. Such a tag can be assembled very simply, due to the fact that the two raised edges can be folded over outwards and inwards respectively in one and the same pressing action.

The invention also relates to a counterpart which has a convex head, and in which the mass distribution between pin and head is selected in such a way that the centre of gravity of the counterpart, viewed in projection on a horizontal plane, lies between the supporting point of the head on a horizontal support and the point of the pin in each position of the latter which deviates from the vertical position. In the case of such a counterpart it is ensured that the point always points downwards if the counterpart is lying on a surface. The risk of injury from the relatively sharp point of the counterpart is eliminated in this way.

The invention will be explained in greater detail below with reference to an exemplary embodiment shown in the figures.

Figure 1 shows a side view, partially in cross-section, of a first embodiment of an anti-theft tag according to the invention.

Figure 2 shows an enlarged detail in cross-section of Figure 1.

Figure 3 shows a variant of the pin with head belonging to the anti-theft tag according to Figure 1.

Figure 4 shows a section through an alternative embodiment of the housing of the tag, at right angles to the centre line.

Figure 5 shows a second embodiment of the tag.

The anti-theft tag 1 shown in Figure 1 comprises a flat plastic carrier 2, in which a coil and capacitor (not shown) are accommodated. A housing 3, through which a bore 4 extends, is fixed to the plastic carrier 2. Said bore 4 can accommodate the pin 5 of a counterpart which is indicated in its entirety by 6, and which also has a rounded head 7. In use, the pin 5 is inserted with its sharp point through an article to be protected, such as a garment, and is then inserted into the bore. The material of the garment then lies between the carrier 2 and the head 7.

The housing 3 also has a second bore 8, in which a ball 9 is movable. The ball 9 is pressed by means of pressure piece 10 by a spring 11 in the direction towards the bore 4. As a result of the acute angle which the bores 4 and 8 form with each other, the pin 5 is clamped between ball 9 and the opposite wall of the bore 4 as soon as an attempt is made to pull the pin

5 out of the bore 4.

As can also be seen in Figure 1, the housing is covered by a cover plate 12 at its side facing away from the plastic carrier 2. This cover plate 12 is fixed by the flanged edge 13 of the housing 3. The cover plate also acts as a stop for the spring 11, and also ensures that bore 4 is not accessible at that side.

At its side facing the carrier 2, the housing has a shoulder 14 which is inserted into a corresponding hole in the carrier 2. Housing 3 is fixed to the carrier 2 by turning back the edge 15 of shoulder 14.

The locking of the pin 5 can be released in the known way by applying a magnetic field which pulls aside pressure piece 10 and ball 9.

It can also be seen clearly from Figure 2 that the pin 5 is very well supported against the part of the wall of bore 4 lying opposite bore 8. This means that the pin 5 is properly supported opposite the place where ball 9 engages thereon. All this promotes a proper locking action.

As shown in the variant of Figure 3, the counterpart 6 can also have a pin 19 which is provided with a number of constrictions 16. A good locking action can also be obtained in the case of this embodiment.

In this embodiment it can also be seen that the head 7 is a special rounded shape. Through this shape of the head 7 it is ensured that, if it accidentally falls to the ground, the counterpart 6 always points with the point 17 downwards, in other words, the point 17 also lies on the ground and does not point upwards as can happen in the case of known pins. The centre of gravity of the whole pin is situated at the position of the cross indicated by 18, which together with the rounded shape of the head 7 ensures that point 17 always points downwards.

The alternative embodiment shown in Figure 4 has a housing 20, of which only a partial cross-section at right angles to the bore 4 for pin 5 is shown. The housing is also provided with two bores 21, 22, each with a ball 23, 24. The cross-section shown is taken through the centre points of the balls 23, 24. The bores also run at the same angle of between 3° and 10° relative to the bore 4, as shown in Figures 1 and 2. In projection on the plane of the cross-section of Figure 4, the bores 21, 22 form an angle of 90° relative to each other. Other angles are also possible, provided that the bores form an angle smaller than 180°, and greater than the angle in which they come to rest against each other without touching the pin 5.

The anti-theft tag 25 shown in Figure 5 comprises a carrier 26 composed of two shell halves 27, 28 glued onto each other, and not shown in any further detail. For the design thereof reference is made to Dutch Application NL-A-8800367. Between these shells is a circuit which is composed in the known way of a coil and capacitor, and which can be detected by means of a suitable radio-frequency field.

One shell 28 also contains a housing 29 in which

the hole 30 for pin 31 is provided. The housing contains a second bore 32, in which a ball 33 is accommodated. The bore 32 also contains a pressure piece 34 of magnetisable material, and also a spring 35 which presses pressure piece 34 and ball 33 in the direction of the first bore 30. The angle between the two bores is 6°.

#### Claims

1. Anti-theft tag comprising a carrier provided with indicator means, and also a counterpart which can be fastened to the carrier, which carrier has a housing which is provided with locking means and in which a pin of the counterpart can be locked, characterised in that the housing has an essentially cylindrical main bore enclosing the pin in a close fit, and at least one auxiliary bore which runs at an acute angle relative to the main bore and opens out therein, which auxiliary bore contains a ball of magnetisable material which is pressed under spring pre-tension in the direction of the main bore, in such a way that the pin can be inserted past the ball, but can be clamped in the opposite direction between the ball and the wall of the main bore.
2. Tag according to Claim 1, in which the auxiliary bore faces away from the insertion hole of the main bore, and runs at an angle between 3 and 10° relative to said main bore.
3. Tag according to Claim 2, in which the angle between main bore and auxiliary bore is 6 degrees.
4. Tag according to Claim 1, 2 or 3, in which a sliding piece of magnetisable material lies between the ball and the spring.
5. Tag according to one of the preceding claims, in which the diameter of the ball is greater than the diameter of the main bore.
6. Tag according to one of the preceding claims, in which various auxiliary bores are provided, each containing a ball, which auxiliary bores all lie at one and the same side of a plane determined by the centre line of the main bore.
7. Tag according to Claim 6, in which each auxiliary bore opens out at the same level in the main bore, in the direction along the centre line of the main bore.
8. Tag according to Claim 7, in which provision is made for two auxiliary bores of which the projections of the central axes on a plane perpendicular

to the centre line of the main bore form an angle of 90°.

9. Tag according to Claim 6, in which the auxiliary bores open out at various levels in the main bore in the direction along the centre line of the main bore.
10. Tag according to one of the preceding claims, in which the carrier is in the form of a flat plastic plate, and the housing is fixed in a hole in the plastic plate by means of a raised edge all the way round the insertion hole of the main bore.
11. Housing for an anti-theft tag according to Claim 10, in which a cylindrical element is provided, which element has a central main bore and at least one auxiliary bore opening out at one end of the element, the cylindrical element having at the other end a shoulder which surrounds the main bore and has a raised edge, which shoulder is intended for insertion into a hole provided in the plastic plate, and which edge is designed to be folded over outwards onto the plastic plate.
12. Housing according to Claim 11, in which at the side where the auxiliary bore opens out there is a raised edge which is designed to be folded over inwards over a cover plate fitting inside the edge.
13. Counterpart for an anti-theft tag according to one of the preceding claims, in which the counterpart has a convex head, and the mass distribution between pin and head is selected in such a way that the centre of gravity of the counterpart, viewed in projection on a horizontal plane, lies between the supporting point of the head on a horizontal support and the point of the pin in each position of the latter which deviates from the vertical position.

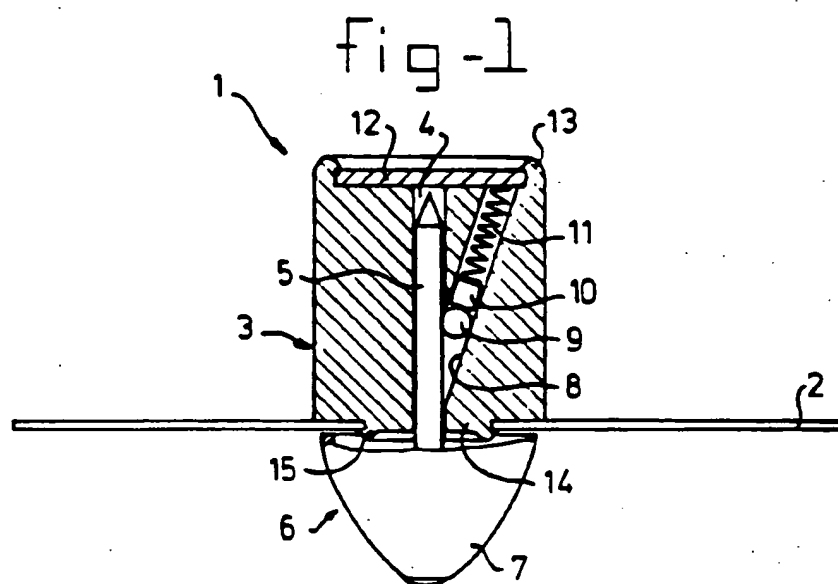


fig-2

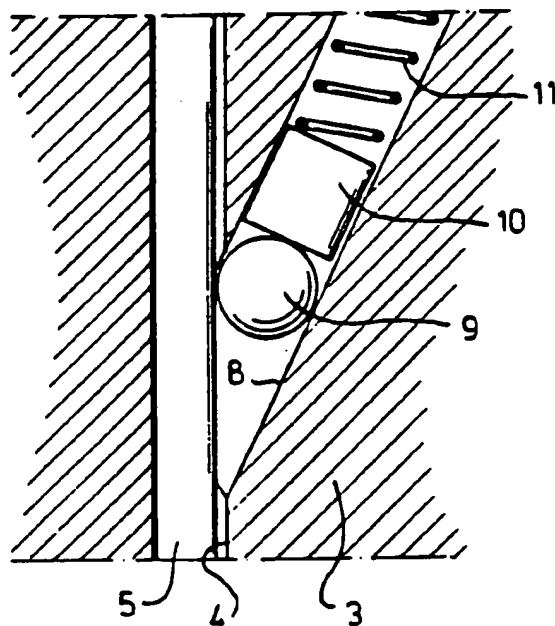


fig-3

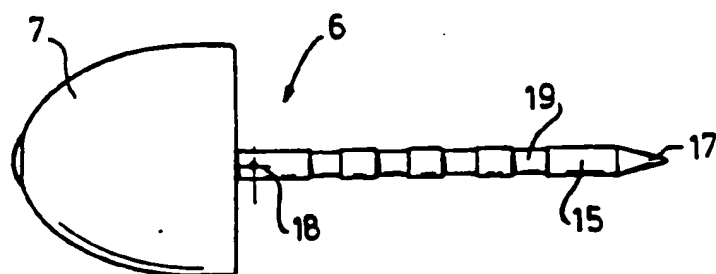


fig - 4

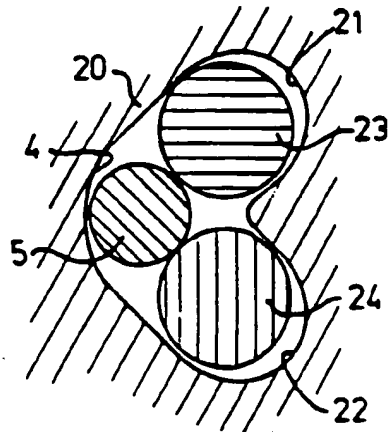
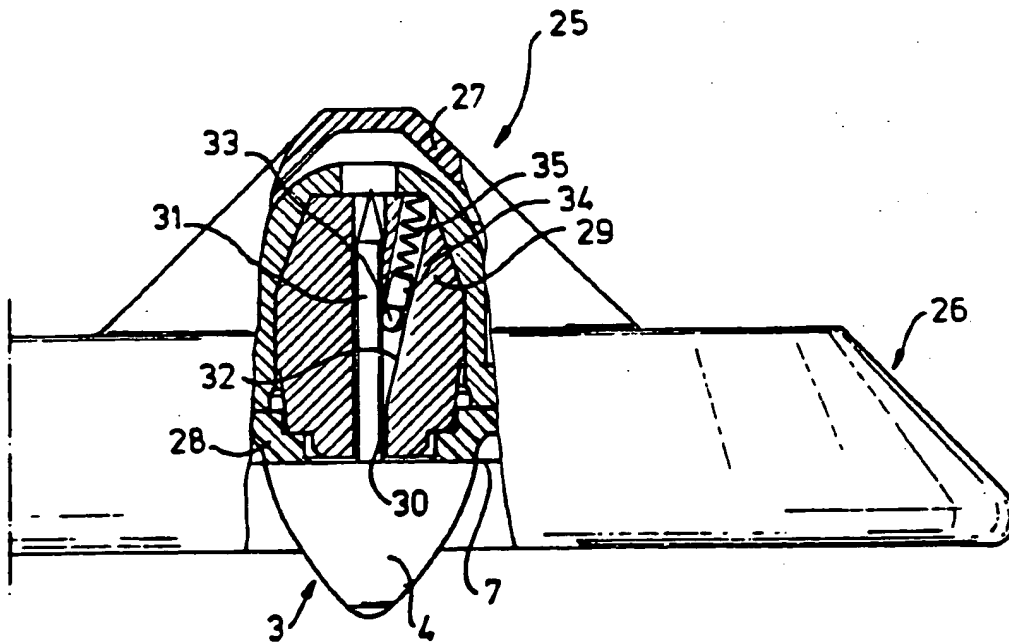


fig - 5





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# EUROPEAN SEARCH REPORT

Application Number

EP 92 20 3696

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	DE-A-2 656 511 (NEDAP) * the whole document *	1-4	G08B13/24 E05B73/00
Y	WO-A-8 401 847 (MICROSCAN) * abstract *	1-4	
A,D	EP-A-0 329 229 (ID SYSTEMS INTERNATIONAL) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G08B E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04 MARCH 1993	Examiner SGURA S.
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